SECRET
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NPIC/TSSG/RED-1891-69
28 October 1969

MEMORANDUM FOR THE RECORD

SUBJECT: Acceptance Tests on Serial Number 1 of the Production Contract for Dual-Viewing Microstereoscopes (File Number 02137)

1. During the period of 9-11 September 1969 and 1-2 October 1969 acceptance tests were performed on the first of ten Dual-Viewing Microstereoscopes to be fabricated by [redacted] under Contract [redacted] 25X1 25X1 25X1 25X1

2. Attached is a transcript of the results of these tests. The instrument proved acceptable and was shipped to NPIC, being received in the building on 16 October 1969.

[redacted] 25X1
SDB/RED/TSSG

Distribution:
Original - Route & File
1 - NPIC/TSSG/RED
2 - NPIC/TSSG/RED/SDB

Declass Review by NIMA/DOD

Excluded from automatic downgrading and declassification

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DUAL-VIEWING MICROSTEREOSCOPE

S/N - 1

ACCEPTANCE TESTS

Performed - 9, 10, 11 September 69
1, 2 October 69

Observers - [redacted] 25X1

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LIGHT INTENSITY

<Observed 9-11-69>

25X1 Instrument - [redacted] Spectra Brightness Spot Meter

25X1 [redacted]

Prototype - 10,500 ft.-lamberts

S/N-1 - 13,000 ft.-lamberts

Required - 1.5X 10,500 = 15,750 ft.-lambert
Uneven light distribution in spot

<Observed 10-1-69>

Prototype - 10,500 ft.-lamberts

Required - 15,750 ft.-lamberts

Measured S/N-1 - 15,100 ft.-l (left source from A-side)
16,500 ft.-l (right source)

Bulbs replaced - these bulbs had been used for an estimated 20/30 hours. Blackening was evident on the inside of the glass envelope.

Measured w/new bulbs - 19,500 ft.-l (left source)
22,000 ft.-l (right source)

Light distribution much improved over observation of 9-11-69

High-intensity plus background illumination - OK
High-intensity position adjustment - OK
Variation (50 to 100% required) - 0 to 100%
Color temperature (3500 to 5500°K)
Measured at 50% of 13,000 ft.-l - 3500°K
Illuminated area (7 X 10) - OK

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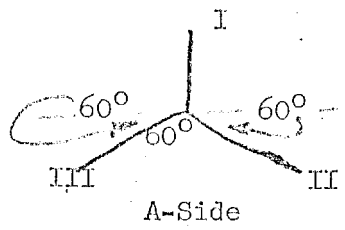
Floor Vibration a Problem

Resolution - Axial



25X1 A Observer
B Observer
Observed 9-11-69
0° Pechan Setting
25X1 Targets - [redacted]

		Required	Max	63	189	283	356
			Min	50	161	238	304
Position	Station	Eyepiece		11X	36.3X	57.5X	75X
I	A	L		72	181		323
	A	R		72	181		362
	B	L		57	144		287
	B	R		57	128		287
II	A	L		72	181		362
	A	R		72	181		362
	B	L		57	144		287
	B	R		57	144		287
III	A	L		64	181		323
	A	R		72	181		323
	B	L		57	144*		256
	B	R		57	144		256

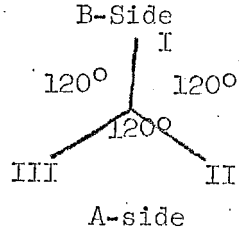
*Observer B views 181 l/mm with aid of diopter telescope. Therefore, all Observer B readings are low.

Rotating rhomboids made no difference in resolution readings at 11X. No further rotating of rhomboids was therefore performed.

Rotation of Pechan prism made no significant difference in resolution readings at 11X. Rotation of the Pechan was performed only occasionally thereafter.

Resolution readings were discontinued because of time and because light intensity was determined to be below specs.

Resolution - Axial



25X1 Observer - [redacted]
Observed - 10-1-69
0° Pechan Setting
25X1 Targets - [redacted] 5-bar

(continued next page)

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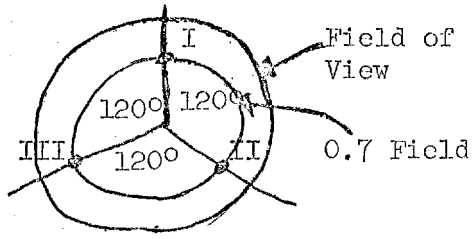
Floor Vibration a Problem

			11X	36.3X	57.5X	75X
Required	max		63	189	283	356
	min		50	161	238	304
Position	Station	Eyepiece				
I	A	L	72	203	280	360
	A	R	72	203	287	360
	B	L	72	203	280	360
	B	R	72	203	280	360
II	A	L	72	Axial positioning made no apparent difference-- determinations discontinued		
	A	R	72			
	B	L	72			
	B	R	72			
III	A	L	72			
	A	R	72			
	B	L	72			
	B	R	72			

Minimums (By rotating Pechan at each position)

B	L	64	181	250	320
B	R	64	181	250	320
A	L	64	181	250	320
A	R	57	181	256	320

Resolution - 0.7 Field



25X1 Observer - [redacted]
Observed 10-1-69
0° Pechan Setting
25X1 Targets - [redacted] 5-bar

Required	max	50	134	200	267
	min	50	134	200	240

Air Conditioner in Room Turned Off - Much Less Problem with Vibration

Position	Station	Eyepiece	11X	36.3X	57.5X	75X
I	A	L	64	181	250	280
	A	R	57	161	220	280
	B	L	57	181	220	280
	B	R	64	161	220	280
II	A	L	57	181	250	280
	A	R	64	181	250	320
	B	L	64	181	250	280
	B	R	57	161	220	320
III	A	L	64	161	220	280
	A	R	57	181	220	280
	B	L	64	181	220	320
	B	R	64	181	250	280

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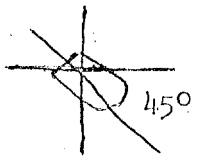
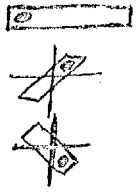
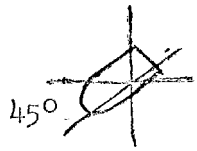
Minimums (Rotating Pechan)

A	L	57	144	220	250
A	R	57	144	200	250
B	L	57	144	200	280
B	R	57	161	200	250

Field of View

Observed 9-10-69
Target - Glass scale

Mag	Position of Rhomboid	Position of Scale	Station	Eyepiece	Field
70X			A	R	2.86 mm
			A	R	2.86
			A	R	2.85
			Pechan Rotation	0°	2.85
				90°	2.85
				180°	2.84
				90°	2.84
				0°	2.85
					
72X				90°	2.85
				180°	2.84
				90°	2.85
				0°	2.85
50X			A	R	4.0
30X			A	R	6.63
11X			A	R	17.99
11X			A	L	18.03
30X			A	L	6.67
50X			A	L	4.01
70X			A	L	2.83
70X				0°	
				90°	
				180°	
				90°	
				0°	
				90°	
				180°	
				90°	
				0°	2.83

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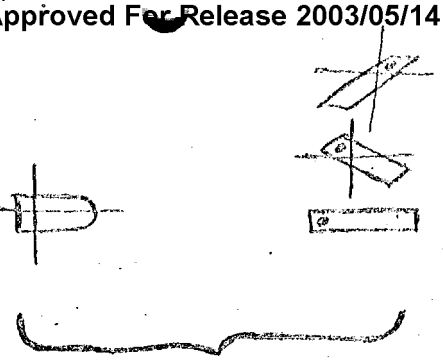
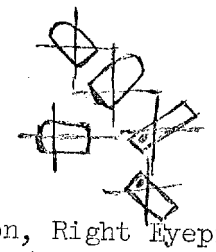


50X	A	L	4.01
	A	L	3.99
70X	B	L	
	Image Rotation	0°	2.83
		120°	
		240°	
		360°	
		480°	
		600°	
		720°	2.83
50X		0°	3.99
		120°	4.00
		240°	4.00
		360°	3.99
		480°	4.00
		600°	4.00
		720°	3.99
30X		0°	6.63
		120°	
		240°	
		360°	
		480°	
		600°	
		720°	6.63
11X		0°	18.02
		120°	18.03
		240°	18.06
		360°	18.02
		480°	18.03
		600°	18.04
		720°	18.02
		0°	18.02
		0°	18.02
		0°	18.05
		0°	18.08



B Station, Right Eyepiece magnifications cannot be set accurately because of phoria eyepiece. At minimum magnification field = 17.9 mm.

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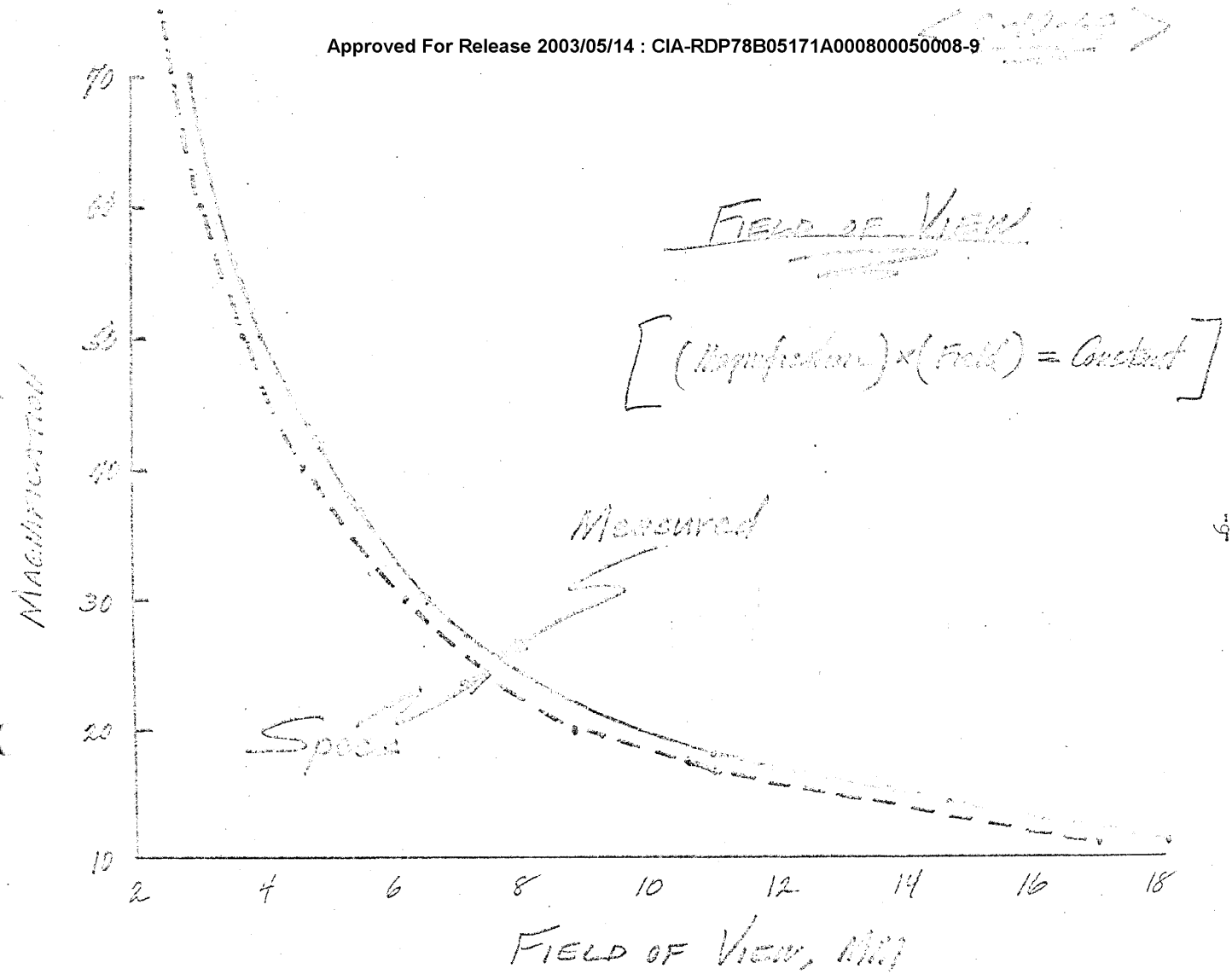

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Magnification

Observed 9-9-69
Target - Glass scale
0° Pechan Setting
25X1 Eyepiece - [redacted] 10X, with 14mm diameter reticle

$$\text{Lgth on scale} = \frac{D_{\text{reticle}}\, M_{\text{eyepiece}}}{M_{\text{system}}}$$

$$= 14\, \frac{M_{\text{eyepiece}}}{M_{\text{system}}}$$

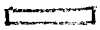
Station	Eyepiece	Pos. of Scale	Field	Mag
A	R		12.9 mm 1.885	10.85X min 74.3X max
		making meas. through glass scale	12.83 1.89	
		making meas. with cover glass	12.9 1.89	

Image rotation causes negligible effect

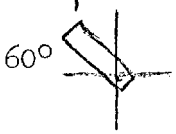
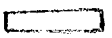
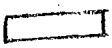
			12.94 1.89	10.8X min 74.1X max
			12.91 1.89	10.8X min 74.1X max
A	L		12.76 1.87	11.0X min 75X max
B	L		12.8 1.87	10.9X min 75X max

Image rotation causes negligible effect.

B	R	Could not be checked because phoria eyepiece not removable.

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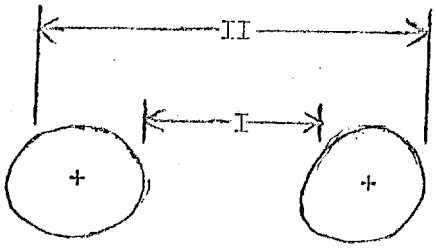
Air Base Accommodation
(Distances Between Objectives)

Observed 9-9-69
Target - Glass Scale

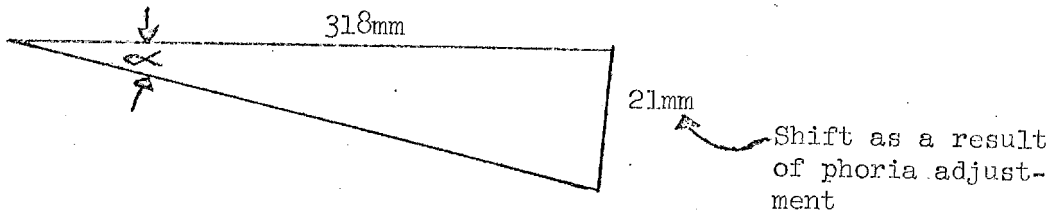


37 mm min
Required 133mm max

Station	IPD	I	II	Ave
A	55mm	132.44mm	137.81mm	135.12mm
	77mm	132.43	137.83	135.13
B	55	132.38	137.72	135.05
	77	132.41	137.74	135.08
A	55	32.00	38.41	35.20
	77	32.00	38.42	35.21
B	55	31.93	37.36	34.64
	77	31.91	37.38	34.64

Vertical Phoria

Observed 9-10-69
Target - Ground glass



$\alpha = \tan^{-1} \frac{21}{318} = 3.8^{\circ}$

Required $\pm$ 1.5° min.

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Temperature

Observed 9-11-69
Instrument - Dial-Type Thermometer of Unknown Accuracy

High-intensity illumination, background illumination, and pointer illumination left on all night at maximum settings.

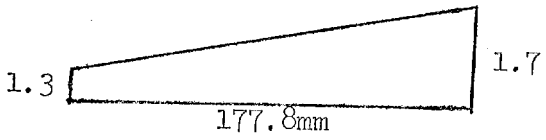
Glass surface	- 84° F
ΔX- ΔY table (metal) surface	- 78°
High-intensity Source Shield	- 86°
Ambient Temperature	- 68°

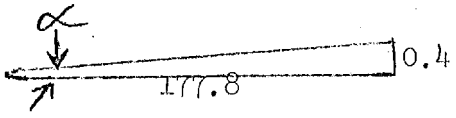
Image Orientation

Observed 9-10-69
Target - Imagery, graph paper

Position - up, down, right, left OK
Rotation -

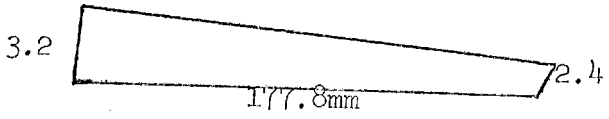
Station A:

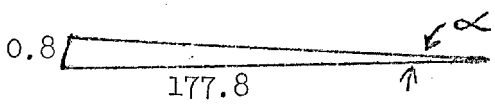




$$\alpha = \tan^{-1} \frac{0.4}{177.8} = 7 \text{ min.}$$

Station B:





$$\alpha = \tan^{-1} \frac{0.8}{177.8} = 14 \text{ min}$$

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Total angle = 7 + 14 = 21 min.

Graph Paper Target
0° Pechan Settings

With vertical lines parallel as viewed from Station A, horizontal lines are slightly at an angle, and Station B sees both horizontal and vertical lines at slight angle. Rotation of image rotation knobs allows fusion of sgnares.

IPD Adjustment

Observed 9-9-69
Required - 55 to 77 mm

Station	Min	Max
A	52.35mm	78.75mm
B	52.0	79.0

0.8mm backlash in IPD mechanism at B station observed 9-9-69 was subsequently removed by 10-1-69

Focus

Observed 9-9-69
Required +5 diopters
25X1 Instrument - [redacted] Diopter Telescope

Station	Eyepiece	Range
A	L	-5 to +4
A	R	-5 to +4
B	L	-5 to +4
B	R	-5 to +4

Diopter telescope only had a range of -5 to +4 but eyepieces each had a range of greater than +4.

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Stage Motion

Observed 9-9-69
Required - Common Motion ± 3.5 in. Y
± 2.5 in. X
Δ X one Plate ± 1 in.
Δ Y one Plate ± 1 in.

Total motion - 9 1/8 in. Y 5 7/8 in. X
Δ X - 4 in.
Δ Y - 2 in.

Table

Observed 9-9/10-69
Instrument - VOM
Required - 48 X 32

48 X 32 X 29 - OK
Lockable Casters - OK
Grounded - OK

Reticle Illumination

Observed 9-9-69
Target - Density wedge

Reticle observed with step wedge densities of 0.08 to 2.5 units. Reticle exhibited adequate range of contrast.

A red filter was supplied that was easily removable.

Carrier Plates

Observed 9-9-69

5 X 7 free aperture required on each plate. S/N-1 satisfies this requirement.

Holddown Plates

Observed 9-9-69

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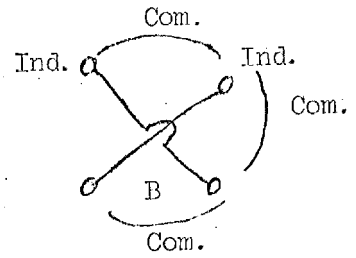
Two 3 X 4 and two 5 X 7 glass plates were provided. One 5 X 7 plate was chipped on corner and will be replaced.

Common Zoom & Independent Zoom

Observed 9-9-69

Requirement:



S/N-1 satisfies requirement

Image Rotation

Observed 9-9-69

360° Rotation required - S/N-1 satisfies requirement

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